

jc849 U.S. PRO  
40/AC/IN

10-30-00

Attorney's Docket No. 00-0640  
Client's Docket No. FRA2269CIP

**PATENT Utility APPLICATION COVER SHEET**

BOX PATENT APPLICATION  
HONORABLE ASSISTANT COMMISSIONER FOR PATENTS  
Washington, D. C. 20231

Sir:

Transmitted herewith for filing is the utility patent application  
of:

INVENTOR: ROBERT A FRANCIS

FOR: IMPROVED TOILET SPLASH SHIELD SYSTEM

**Enclosed are:**

- ☒ Postcard for receipt stamp and return.
- ☒ Applicant's Check for **\$355.00**, covering fees calculated below.
- ☒ Specification with Claims, Abstract, & Declaration & Power of Attorney
- ☒ A verified statement to establish small entity status under 37C.F.R § 1.9 and 37 C.F.R. § 1.27.
- ☒ 15 sheets of drawing.
- ☐ Cover Sheet & Assignment to: \_\_\_\_\_
- ☐ Information Disclosure Statement.

**The filing fee has been calculated as shown below:**

	(Col. 1)	(Col. 2)	SMALL ENTITY	
FOR:	No. Filed	No. Extra	RATE	FEE
BASIC FEE			\$355	\$355
TOTAL CLAIMS	20	-20= 0	x09	0
INDEPENDENT CLAIMS	3	- 3= 0	x39	0
MULTIPLE DEPENDENT CLAIMS PRESENTED			+125	
<b>TOTAL</b>				<b>\$355</b>

DEPOSIT ACCOUNT AUTHORIZATION

The Commissioner is hereby authorized to charge any fees, which are not otherwise submitted and which may be required under 37 CFR 1.17 during the entire pendency of this application, to the Deposit Account # **11-0020**.



IVAR M. KAARDAL, Reg. No. 29,812  
KAARDAL & ASSOCIATES, PC  
3500 South First Ave. Circle-Suite 250  
SIOUX FALLS, SD 57105-5802  
(605) 336-9446 FAX (605) 336-1931  
e-mail: patent@kaardal.com

October 27, 2000

Date

PRO  
5666915  
09/26/00  
10/26/00

Attorney's Docket No. 00-0640  
Client's Docket No. FRA2269CIP



**In the United States Patent and Trademark Office**

In re Application of:  
ROBERT A FRANCIS

Filed: **UTILITY PATENT APPLICATION**

For: **IMPROVED TOILET SPLASH SHIELD SYSTEM**

Assistant Commissioner for Patents and Trademarks  
Washington, D.C. 20231

Date of Deposit: **October 27, 2000**

I hereby certify that the attached U.S. Patent Application, informal drawings, transmittal letter, priority document, and/or Preliminary Amendment are being deposited with the United States Postal Service under Express Mail service **#EL 493061805 US** on the date indicated above and is addressed to the Box Patent Application, Assistant Commissioner for Patents, Washington, D.C. 20231.



**October 27, 2000**  
Date

RANDI VANDER WILT  
KAARDAL & ASSOCIATES, PC  
3500 South First Ave. Circle-Suite 250  
SIOUX FALLS, SD 57105-5802  
(605) 336-9446 FAX (605) 336-1931  
e-mail patent@kaardal.com

Attorney's Docket No. K&A 00-0640  
Client's Docket No. FRA2269REL

**APPLICATION**

**FOR UNITED STATES LETTERS PATENT**

----

**SPECIFICATION**

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, **ROBERT A. FRANCIS**, a citizen of  
UNITED STATES OF AMERICA, have invented a new and useful  
**IMPROVED TOILET SPLASH SHIELD SYSTEM** of which the  
following is a specification:

## IMPROVED TOILET SPLASH SHIELD SYSTEM

5

### BACKGROUND OF THE INVENTION

10 The present invention relates to splash guards and more particularly pertains to an improved toilet splash shield system for preventing urine and waste from splashing out of a toilet bowl.

15 The use of splash guards is known in the prior art. More specifically, splash guards heretofore devised and utilized are known to consist basically of familiar, expected and obvious structural configurations, notwithstanding the myriad of designs encompassed by the crowded prior art which have been developed for the fulfillment of countless objectives and requirements.

20 One especially useful toilet splash shield system is disclosed in my United States Patent No. 6,041,451. Although the system described in the 6,041,451 patent is highly useful, some aspects of the invention, especially those involving systems which are integral with a toilet, could benefit from further improved structure and  
25 enhanced function. One illustrative area for improvement is the movement of air into the interior of the bowl by the splash shielding system, which may cause a buildup of air pressure in the bowl interior, especially when a user is seated on the seat of the

toilet. Another illustrative area for improvement is the flow patterns of air blown into the bowl by the splash prevention system.

The improved toilet splash shield system according to the present invention substantially departs from the conventional concepts and designs of the prior art, and in so doing provides an apparatus primarily developed for the purpose of preventing urine and waste from splashing out of a toilet bowl.

## SUMMARY OF THE INVENTION

The present invention provides an improved toilet splash shield system wherein the same can be utilized for preventing urine and waste from splashing out of a toilet bowl.

The general purpose of the present invention, which will be described subsequently in greater detail, is to provide an improved toilet splash shield system which has many of the advantages of the splash guards mentioned heretofore and many novel features that result in an improved toilet splash shield system which is not anticipated, rendered obvious, suggested, or even implied by any of the prior art splash guards, either alone or in any combination thereof.

To attain this, the present invention generally comprises a toilet bowl comprising a rim having upper and lower sides and front and back ends. The rim has a bore extending therethrough, and the bore is in communication with an air pump. The rim has a plurality of vent holes extending into the bore from an inner perimeter of the rim. Further, the rim has a vent means in communication with the

bore for permitting passage of air from the bore through an inner perimeter of the rim.

Optionally, the rim may include an upper portion and a lower portion, with the upper portion of the rim being separable from and removably mounted on the lower portion of the rim.

Other optional aspects of the present invention include a gasket member for blocking air flow between the seat and the rim of a toilet. The gasket member is mounted on a lower face of the seat so that the gasket member is positionable between the seat and the upper side of the rim when the seat is located in the lowered position.

Yet another optional aspect of the present invention is an air directing member provided on the lower face of the seat for directing air flowing adjacent to the lower face of the seat.

Still another optional aspect of the present invention is an air exhaust structure provided for exhausting air from the interior of the bowl.

There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that will be described hereinafter and which will form the subject matter of the claims appended hereto.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is

not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

Further, the purpose of the foregoing abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientists, engineers and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application. The abstract is neither intended to define the invention of the application, which is measured by the claims, nor is it intended to be limiting as to the scope of the invention in any way.

It is therefore an object of the present invention to provide an improved toilet splash shield system which has many of the advantages of the splash guards mentioned heretofore and many novel features that result in an improved toilet splash shield system which is not anticipated, rendered obvious, suggested, or even

implied by any of the prior art splash guards, either alone or in any combination thereof.

It is another object of the present invention to provide an improved toilet splash shield system which may be easily and efficiently manufactured by employing a split rim structure for a toilet that facilitates forming a bore and a plurality of vent holes in the rim.

It is a further object of the present invention to provide an improved toilet splash shield system which is of a durable and reliable construction.

An even further object of the present invention is to provide an improved toilet splash shield system which is susceptible of a low cost of manufacture with regard to both materials and labor, and which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such improved toilet splash shield system economically available to the buying public.

Still yet another object of the present invention is to provide an improved toilet splash shield system which provides in the apparatuses and methods of the prior art some of the advantages thereof, while simultaneously overcoming some of the disadvantages normally associated therewith.

Still another object of the present invention is to provide an improved toilet splash shield system for preventing urine and waste from splashing out of a toilet bowl.

Yet another object of the present invention is to provide an improved toilet splash shield system which includes a toilet bowl



comprising a rim having upper and lower sides and front and back ends. The rim has a bore extending therethrough, and the bore is in communication with an air pump. The rim has a plurality of vent holes extending into the bore from an inner perimeter of the rim.

5 Further, the rim has a vent means in communication with the bore for permitting passage of air from the bore through an inner perimeter of the rim.

10 Still yet another object of the present invention is to provide an improved toilet splash shield system that manipulates air flow to keep splashes and waste in the toilet bowl. In particular, air is ejected through closely spaced vent holes, creating a blanket effect that permits a stream of liquid to pass down through the "air blanket," but would prevent splashes from coming up through the  
15 air blanket.

Even still another object of the present invention is to provide an improved toilet splash shield system that may turn on automatically when the toilet lid is lifted, or may have a switch that  
20 is activated by body heat.

These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the claims annexed to and  
25 forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

30

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

5

Figure 1 is a schematic side view of an improved toilet splash shield system according to the present invention.

Figure 2 is a schematic side view of the present invention.

10

Figure 3 is a schematic cross sectional view of the present invention taken from line 3-3 of Figure 2.

15

Figure 4 is a diagram illustrating a switch system for controlling the air pump of the present invention.

Figure 5 is a schematic cross sectional view of the present invention.

20

Figure 6 is a schematic cross sectional view of an alternate embodiment of the present invention.

25

Figure 7 is a schematic cross sectional view of the present invention illustrating two different configurations of vent holes.

Figure 8 is a schematic cross sectional view of the present invention taken from line 8-8 of Figure 7.

30

Figure 9 is a diagram illustrating a switch system for controlling the air pump of the present invention.

Figure 10 is a schematic cross sectional view of the present invention taken from line 10-10 of Figure 7.

Figure 11 is a schematic cross sectional view of an integrated version according to the present invention.

Figure 12 is a schematic cross sectional view of the present invention taken from line 12-12 of Figure 11.

Figure 13 is a schematic cross sectional view of the present invention.

Figure 14 is a schematic cross sectional view of the present invention.

Figure 15 is a schematic cross sectional view of the present invention.

Figure 16 is a schematic cross sectional view of the present invention.

Figure 17 is a schematic cross sectional view of an alternate embodiment of the present invention.

Figure 18 is a schematic cross sectional view of the alternate embodiment of the present invention.

Figure 19 is a schematic side sectional view of a toilet with further aspects of the improved toilet splash shield system including the gasket member and the air directing member of the invention.

Figure 20 is a schematic side view a toilet with the two piece rim structure and air exhaust structure of the present invention.

Figure 21 is a schematic enlarged sectional view of a portion of the showing in Figure 19.

Figure 22 is a schematic diagrammatic view of one aspect of the invention employing a disinfectant dispenser system.

Figure 23 is a schematic sectional view of a portion of a toilet bowl rim showing an optional configuration of the invention.

Figure 24 is a schematic side view of a toilet bowl having an optional gasket embodiment of the invention mounted thereon.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the drawings, and in particular to Figures 1 through 24 thereof, an improved toilet splash shield system embodying the principles and concepts of the present invention and generally designated by the reference numeral 10 will be described.

As best illustrated in Figures 1 through 5, the splash shield for a toilet 10 generally comprises an annular main portion 12 designed for mounting below a rim 1 of a toilet bowl 2. The main portion has upper and lower sides 13, 14 and front and back ends 15, 16. The main portion has a bore 17 extending through it. The bore is in communication with a source of pressurized air. The main portion has a plurality of vent holes 18 extending into the bore from an inner perimeter 19 of the main portion.

Preferably, the inner periphery of the main portion is vertically flush with an inner periphery of the rim of the toilet bowl so that it does not lessen the area of the bowl opening into which a user may urinate.

Also preferably, a plurality of generally J-shaped support hooks 20, ideally four hooks each positioned 90 degrees from each other, extend from the main portion and are designed for hooking to the rim of the toilet bowl.

5  
10  
15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80  
85  
90  
95  
100  
105  
110  
115  
120  
125  
130  
135  
140  
145  
150  
155  
160  
165  
170  
175  
180  
185  
190  
195  
200  
205  
210  
215  
220  
225  
230  
235  
240  
245  
250  
255  
260  
265  
270  
275  
280  
285  
290  
295  
300  
305  
310  
315  
320  
325  
330  
335  
340  
345  
350  
355  
360  
365  
370  
375  
380  
385  
390  
395  
400  
405  
410  
415  
420  
425  
430  
435  
440  
445  
450  
455  
460  
465  
470  
475  
480  
485  
490  
495  
500  
505  
510  
515  
520  
525  
530  
535  
540  
545  
550  
555  
560  
565  
570  
575  
580  
585  
590  
595  
600  
605  
610  
615  
620  
625  
630  
635  
640  
645  
650  
655  
660  
665  
670  
675  
680  
685  
690  
695  
700  
705  
710  
715  
720  
725  
730  
735  
740  
745  
750  
755  
760  
765  
770  
775  
780  
785  
790  
795  
800  
805  
810  
815  
820  
825  
830  
835  
840  
845  
850  
855  
860  
865  
870  
875  
880  
885  
890  
895  
900  
905  
910  
915  
920  
925  
930  
935  
940  
945  
950  
955  
960  
965  
970  
975  
980  
985  
990  
995

Preferably, the vent holes are angled downwardly at an angle of at least one degree from a horizontal plane. The most effective range is between at least 1 degree and about 30 degrees downward from the horizontal. The angling needs to be at least 1 degree so that when air streams from opposing vent holes come in contact with each other, the air will not rebound upward. The holes should not be angled beyond 45 degrees or the jets of air will not be effective.

The vent holes may be round or tubular, as shown in Figures 1, 3, and 5. Alternate vent holes include a rectangular configuration, shown in Figures 7 and 8, and conical vent holes, shown in Figures 9 and 10. The rectangular vent holes provide more of a blanket of air than the circular version. The jets of air ejected from the conical vent holes travel faster than the air exiting the round vent holes. In any of these embodiments, the bore could extend out and taper together towards the vent holes, as best seen in Figure 7.

Where round vent holes are used, an inner diameter of each of the vent holes is preferably between 1 and 5 mm. Also preferably, the vent holes are spaced between 3 and 10 mm apart from outer edges thereof. This spacing is close enough that a "shield" effect is created, much like a blanket of air, through which splashes cannot travel.

Alternatively, as illustrated in Figure 6, the main portion could have a vent slot 21 extending outwardly from the bore through an inner perimeter of the main portion. Again, the vent slot should angled downwardly at an angle of at least one degree from a horizontal plane, but not over 45 degrees.

Preferably, an air pump 22 provides the source of compressed air and is in communication with the bore of the main portion. The air pump should be capable of producing an output of 10 to 500 psi. Exemplary air pumps include rotary blowers as well as fans with radial blades.

Also preferably, the lower side of the main portion has four openings 23 into the bore. Ideally, the openings are positioned at 90 degree intervals about the main portion. Four air supply lines 24 are connected to the openings of the main portion and in fluid communication with the air pump. Ideally, the air supply lines extend along the lower side of the main portion so that they do not obstruct installation of the device nor be an obstruction that would splash urine out of the bowl if urinated upon.

Preferably, the air supply lines extend around an inner portion of the back end of the main portion and over the rim of the toilet bowl and between the hinges of the toilet seat 25 to the air pump. Ideally, the air supply lines taper together and open into a single tube, which has an air pressure adjustment valve 26 for adjusting the volume of air travelling to the main portion.

A seat switch 27 may be mounted to an upper surface of the rim of the toilet bowl and be in electrical communication with the air pump. The switch would activate the pump when the toilet seat

is raised. The switch would deactivate the pump when the toilet seat is lowered.

An override switch 28 may disconnect the seat switch from the air pump. This would be useful in a household has children or child guests who would play with the toilet seat merely to activate the device. More importantly, it would allow the user to turn the air pump off when cleaning the toilet bowl.

Alternatively or in any combination with the above switches, a pressure transducer 29 is coupled to an upper surface of a toilet seat and in communication with the air pump. The pressure transducer activates the air pump when a user sits on the toilet seat.

Alternatively or in any combination with the above switches, a temperature transducer 30 is coupled to an upper surface of a toilet seat and in communication with the air pump. The temperature transducer senses the body heat of a user sitting on the toilet seat whereupon it activates the air pump.

Alternatively or in any combination with the above switches, an auxiliary switch 31 may be in communication with the air pump for selectively activating the air pump independent of the seat switch. This would be used when the seat is not raised and would ideally be located near the toilet flushing handle for convenience.

Alternatively or in any combination with the above switches, an abort switch 32 may be used to deactivate the air pump. As shown in Figure 9, all of the switches would be connected to the abort switch. The abort switch allows a user to completely shut down the system, especially necessary when cleaning the toilet,

where any of the number of switches could be accidentally activated.

In use, the main portion is installed in a toilet bowl with the  
5 vent holes aiming downward. The air pressure is set so that the  
shield of air created by the air escaping the vents is weak enough to  
allow the penetration of a stream of liquid (such as urine) but  
strong enough to prohibit any back or upward splash of liquids that  
would ordinarily splash onto the rim or completely out of the bowl.  
10 The switches control activation of the pump substantially as set  
forth above.

In an alternate embodiment, shown in Figures 11 through 18,  
the device is integrated into a toilet bowl. In such an embodiment,  
15 a rim 43 of the toilet bowl has upper and lower sides and front and  
back ends. The rim has a bore 41 extending through it. The bore is  
in communication with a source of pressurized air.

The rim has a plurality of vent holes 42 extending into the  
20 bore from an inner perimeter of the rim. The vent holes are angled  
downwardly at an angle of at least one degree from a horizontal  
plane. The most effective range is between at least 1 degree and  
about 30 degrees downward from the horizontal. The angling needs  
to be at least 1 degree so that when air streams from opposing vent  
25 holes come in contact with each other, the air will not rebound  
upward. The holes should not be angled beyond 45 degrees or the  
jets of air will not be effective.

The vent holes may be round or tubular, as shown in Figure  
30 11. Alternate vent holes include a rectangular configuration, shown  
in Figures 14 and 17, and conical vent holes, shown in Figures 15  
and 18. The rectangular vent holes provide more of a blanket of air



than the circular version. The jets of air ejected from the conical vent holes travel faster than the air exiting the round vent holes. In any of these embodiments, the bore could extend out and taper together towards the vent holes, as best seen in Figures 17 and 18.

5

Where round vent holes are used, an inner diameter of each of the vent holes is preferably between 1 and 5 mm. Ideally, the vent holes are spaced between 3 and 10 mm apart from outer edges thereof. This spacing is close enough that a "shield" effect is created, much like a blanket of air.

10

Alternatively, as illustrated in Figure 16, the rim could have a vent slot 47 extending outwardly from the bore through an inner perimeter of the rim. Again, the vent slot should angled downwardly at an angle of at least one degree from a horizontal plane, but not over 45 degrees.

15

An air pump is in communication with the bore of the rim. The air pump should be capable of producing an output of 10 to 500 psi. Exemplary air pumps include rotary blowers as well as fans with radial blades.

20

A seat switch 27 may be mounted to an upper surface of the rim of the toilet bowl and be in electrical communication with the air pump. The switch would activate the pump when the toilet seat is raised. The switch would deactivate the pump when the toilet seat is lowered.

25

An override switch 28 may disconnect the seat switch from the air pump. This would be useful in a household has children or child guests who would play with the toilet seat merely to activate

30

the device. More importantly, it would allow the user to turn the air pump off when cleaning the toilet bowl.

Alternatively or in any combination with the above switches,  
5 a pressure transducer 29 is coupled to an upper surface of a toilet seat and in communication with the air pump. The pressure transducer activates the air pump when a user sits on the toilet seat.

Alternatively or in any combination with the above switches,  
10 a temperature transducer 30 is coupled to an upper surface of a toilet seat and in communication with the air pump. The temperature transducer senses the body heat of a user sitting on the toilet seat whereupon it activates the air pump.

Alternatively or in any combination with the above switches,  
15 an auxiliary switch 31 may be in communication with the air pump for selectively activating the air pump independent of the seat switch. This would be used when the seat is not raised and would ideally be located near the toilet flushing handle for convenience.

Alternatively or in any combination with the above switches,  
20 an abort switch 32 may be used to deactivate the air pump. As shown in Figure 9, all of the switches would be connected to the abort switch. The abort switch allows a user to completely shut  
25 down the system, especially necessary when cleaning the toilet, where any of the number of switches could be accidentally activated.

The modified toilet bowl is used in the same manner as the  
30 splash shield set forth above.

Optionally, as best illustrated in Figures 19 through 21, a further improved toilet splash shield system 110 may generally comprise a toilet 112, a seat assembly 122, a gasket member 132, an air directing member 134, and an air exhaust structure 156.

5 A toilet 112 suitable for use with the invention comprises a lower bowl 114 having an interior for holding water. The toilet also includes an upper rim assembly formed along an upper section of the bowl and defining an opening 117 into the interior of the toilet. The upper rim assembly comprises a rim 116 having upper 10 118 and lower 119 sides and front 120 and back 121 ends.

The seat assembly 122 is positioned adjacent to the upper side of the rim (see Figure 19). The seat assembly includes a seat 124 15 pivotally mounted on the rim for permitting pivoting of the seat from a lowered position oriented adjacent the rim and a raised position oriented substantially perpendicular to the rim. The seat has an upper face 126 and a lower face 127 and a central opening 128. The seat also has an outer perimeter 130 and an inner 20 perimeter 131, with the inner perimeter defining the central opening.

A gasket member 132 is provided for blocking air flow between the seat 124 and the rim 116 of the toilet. The gasket 25 member 132 is mounted on the lower face 127 of the seat so that the gasket member is positionable between the seat and the upper aide of the rim when the seat is located in the lowered position. The gasket member is preferably formed of a compressible material for forming a snugly-fitting barrier between the seat and rim when the 30 seat is in the lowered position. The gasket member is positioned between the inner 131 and outer 130 perimeters of the seat. The

gasket member suitably has an annular shape surrounding the central opening 128 of the seat.

An air directing member 134 is provided for directing air flowing adjacent to the lower face 127 of the seat. The air directing member is mounted on the lower face of the seat. The air directing member may be positioned adjacent to the inner perimeter 131 of the seat, preferably between the gasket member 132 and the inner perimeter 131 of the seat. The air directing member has a directing surface 136 with a directing groove 138 formed thereon which is oriented downwardly toward the bowl and toward air flowing about the bowl, such as from the splash shielding system. Significantly, the channel is employed to redirect air rising from the bowl toward the seat in a manner that produces a secondary splash shielding air flow, as shown in Figure 19. This air flow from the channel of the directing member is oriented substantially parallel to air flowing out of the vent holes of the splash shielding system, which will now be described in greater detail.

The splash shielding system includes a bore 140 formed in a central area of the rim 116 and extending along the rim in a substantially continuous loop. A plurality of vent holes 142 are formed in the rim, and the vent holes extend between an inner perimeter of the rim and the bore 140 so the air in the bore is able to flow into the bowl of the toilet.

Significantly, an air exhaust structure 156 is provided for exhausting air from the interior of the bowl, and may provide a vent to any air pressure built up in the interior of the bowl when the splash shielding system is utilized. The air exhaust structure includes an air exhaust port 158 formed through the wall of the

bowl. Preferably, the air exhaust port is located adjacent the rim and above the water line in the bowl. The exhaust port preferably comprises a substantially cylindrical channel 160 that has an opening into the interior of the bowl which is located at a vertical level below an opening into the exterior of the bowl. Optionally, other channel shapes may be used. The air exhaust structure includes a replaceable air filter cartridge 162 that is removably received in the channel of the exhaust port such that the cartridge may be replaced by inserting a new cartridge. Optionally, the filtering element of the cartridge may be scented to provide a pleasing scent to air exiting the interior of the bowl.

Another highly preferred aspect of the invention provides a rim having an upper portion 164 and a lower portion 166, with the upper portion of the rim being separable from the lower portion. Preferably, the upper 164 and lower 166 portion meet in a separation plane, and the vent holes 142 of the splash shielding system extend along and lie in the separation plane. The upper portion of the rim may be permanently or removably mounted on the lower portion of the rim, and the lower portion of the rim may be formed as an integral part with the bowl 114. A lower surface 168 of the upper portion 164 preferably has an upper portion 170 of the bore formed therein, and an upper surface 169 of the lower portion 166 has a lower portion 171 of the bore formed therein. In this manner, the split rim structure of the rim of the invention can facilitate manufacturing of the bore and vent holes in the rim prior to assembly of the upper and lower rim portions together.

Optionally, the separation plane of the rim may be oriented in a plane that is skewed with respect to the plane of the vent holes (see FIG. 23). As a further option, a gasket 172 may be positioned

between the upper 174 and lower 175 portions of the rim for enhanced sealing against air leakage from the bore at the juncture of the upper and lower portions. As a still further option, a fastener channel 176 may be formed in the rim with sections of the channel 176 in each of the upper 174 and lower 175 portions of the rim so that a fastener (not shown) may be positioned in the sections for securing the portions 174, 175 of the rim together.

In conjunction with the air supply pump 22 and the bore 140 in the bowl rim, a disinfectant dispenser 154, such as an atomizer, may be interposed in the air supply line (see FIG. 23) between the pump and the bore for dispensing a disinfectant into the air flow for disinfecting and sanitizing the interior of the bowl through the air flowing through the system of the invention.

The gasket 172 may optionally be provided with one or more valves 178 (see FIG. 24) that permit air flow in an inward direction through the wall of the gasket toward the interior of the bowl for preventing the formation of a relatively lower pressure condition in the bowl with respect to outside the bowl when a user is seated on the toilet seat with the gasket in position. The valve 178 may comprise a flexible, pliable plastic diaphragm mounted in a hole formed in the gasket.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and

described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous  
5 modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the  
10 scope of the invention.

## CLAIMS

I claim:

1. A toilet bowl, comprising:  
a rim having upper and lower sides and front and back ends;  
said rim having a bore extending therethrough, said bore being in  
communication with an air pump;  
said rim having a plurality of vent holes extending into said bore  
from an inner perimeter of said rim; and  
said rim having a vent means in communication with said bore for  
permitting passage of air from said bore through an inner  
perimeter of said rim.
2. The toilet bowl of claim 1 wherein said vent means  
comprises a plurality of vent holes being angled downwardly at an  
angle of at least one degree from a horizontal plane.
3. The toilet bowl of claim 1 further comprising a seat switch  
being mounted to an upper surface of said rim of said toilet bowl  
and in communication with said air pump, said seat switch  
activating said pump when said toilet seat is raised, said switch  
deactivating said pump when said toilet seat is lowered.
4. The toilet bowl of claim 1 further comprising an override  
switch for disconnecting said seat switch from said air pump.
5. The toilet bowl of claim 1 further comprising a pressure  
transducer adapted for coupling to a toilet seat and in  
communication with said air pump, said pressure transducer  
activating said air pump when a user sits on said toilet seat.



6. The toilet bowl of claim 1 further comprising a temperature transducer adapted for coupling to an upper surface of a toilet seat and in communication with said air pump, said temperature transducer sensing body heat of a user sitting on said toilet seat whereupon it activates said air pump.

7. The toilet bowl of claim 1 further comprising an auxiliary switch in communication with said air pump for selectively activating said air pump independent of said seat switch.

8. The toilet bowl of claim 1 further comprising an abort switch for deactivating said air pump.

9. A toilet seat assembly for mounting on a toilet of the type having a lower bowl and an upper rim, the upper rim being formed along an upper section of the bowl, the toilet seat assembly comprising:

a seat adapted for pivotally mounting on the rim of the toilet for permitting pivoting of the seat from a lowered position oriented adjacent the rim and a raised position oriented substantially perpendicular to the rim, the seat having an upper face and a lower face, the seat having a central opening, the seat having an outer perimeter and an inner perimeter; and a gasket member for blocking air flow between the seat and the rim of the toilet, the gasket member being mounted on the lower face of the seat, the gasket member being positionable between the seat and the upper side of the rim when the seat is located in the lowered position, the gasket member being formed of a compressible material for forming a snugly-fitting barrier between the seat and rim when the seat is in the lowered position.

10. The assembly of claim 9 wherein the gasket member extends between the inner and outer perimeters of the seat, the gasket member having an annular shape surrounding the central opening of the seat.

11. The assembly of claim 9 additionally comprising an air directing member for directing air flowing adjacent to the lower face of the seat, the air directing member being mounted on the lower face of the seat, the air directing member having a directing surface with a directing groove formed thereon.

12. The assembly of claim 11 wherein the air directing member is positioned adjacent to the inner perimeter of the seat, the air directing member being positioned between the gasket member and the inner perimeter of the seat.

13. A splash shielding system, comprising:  
a toilet having a lower bowl having an interior and an upper rim assembly, the upper rim assembly being formed along an upper section of the bowl, the upper rim assembly comprising a rim having an upper side, a bore being formed in a central area of the rim and extending along the rim, a plurality of vent holes being formed in the rim, the vent holes extending between an inner perimeter of the rim and the bore;  
a seat assembly being positioned adjacent to the upper side of the rim, the seat assembly including a seat pivotally mounted on the rim for permitting pivoting of the seat from a lowered position oriented adjacent the rim and a raised position oriented substantially perpendicular to the rim, the seat having a lower face, the seat having an outer perimeter and an inner perimeter, the inner perimeter defining a central

opening, the inner perimeter having an inner perimeter edge;  
and

a splash shielding system for shielding a user from splashing in the interior of the bowl, the splash shielding system including an air pump being in communication with the bore of the rim and being adapted to move air into the bore when the air pump is activated, and activating means for activating the air pump.

14. The system of claim 13 wherein the rim of the toilet comprises an upper portion and a lower portion, the upper portion of the rim being separable from the lower portion, the upper portion being removably mounted on the lower portion of the rim.

15. The system of claim 14 wherein the upper and lower portions of the rim meet in a separation plane, and the vent holes in the rim extend along the separation plane, the lower portion of the rim being mounted on the bowl, a lower surface of the upper portion having a portion of the bore formed therein, an upper surface of the lower portion having a portion of the bore formed therein.

16. The system of claim 13 wherein the seat assembly comprises a gasket member for blocking air flow between the seat and the rim of the toilet, the gasket member being positionable between the seat and the upper side of the rim when the seat is located in the lowered position.

17. The system of claim 13 wherein the seat assembly comprises an air directing member for directing air flowing adjacent to the lower face of the seat, the air directing member being mounted on the lower face of the seat, the air directing

member having a directing surface with a directing groove formed thereon.

18. The system of claim 17 wherein the air directing member is positioned adjacent to the inner perimeter of the seat.

19. The system of claim 13 additionally comprising an air exhaust structure for exhausting air from the interior of the bowl, the air exhaust structure including an air exhaust port extending through the wall of the bowl.

20. The system of claim 19 wherein the air exhaust structure includes a replaceable air filter cartridge removably received in the channel of the exhaust port.

**ABSTRACT OF THE DISCLOSURE**

5       An improved toilet splash shield system for preventing urine  
and waste from splashing out of a toilet bowl. The improved toilet  
splash shield system includes a toilet bowl comprising a rim having  
upper and lower sides and front and back ends. The rim has a bore  
extending therethrough, and the bore is in communication with an  
10   air pump. The rim has a plurality of vent holes extending into the  
bore from an inner perimeter of the rim. Further, the rim has a vent  
means in communication with the bore for permitting passage of air  
from the bore through an inner perimeter of the rim.

**DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**IMPROVED TOILET SPLASH SHIELD SYSTEM**

the specification of which is attached hereto.

I further state that I do not know and do not believe that the above-named invention has ever been known or used in the United States before my invention thereof, or patented or described in any printed publication in any country before my invention thereof, or in public use or on sale in the United States more than one year prior to this application; that the invention has not been patented or made the subject of any inventor's certificate in any country foreign to the United States on any application filed by me or my legal representatives or assigns more than one (1) year prior to this application; and that no application for patent or inventor's certificate on the invention has been filed by me or my representatives or assigns in any country foreign to the United States, except as identified below.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment if applicable.

I acknowledge the duty to disclose information to the Patent and Trademark Office all information known to me to be material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

<u>NONE</u>	<u>                    </u>	<u>                    </u>	<u>                    </u>	<u>                    </u>
(Number)	(Country)	(Day/Month/ Year Filed)	(Yes)	(No)

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States Provisional application(s) listed below:

<u>NONE</u>	<u>                    </u>
(Application No.)	(Filing Date)

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or Section 365 (c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, Section 112. I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

<u>NONE</u>	<u>                    </u>	<u>                    </u>
(Application No.)	(Filing Date)	(Status - patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys to prosecute this application and transact all business in the U.S. Patent and Trademark Office connected therewith: Ivar M. Kaardal, Registration Number 29,812.

Send Correspondence to: Kaardal & Associates, PC  
Attn: Ivar M. Kaardal  
3500 South First Ave. Circle - Suite 250  
Sioux Falls, South Dakota 57105-5802  
Telephone (605) 336-9446, FAX (605) 336-1931  
e-mail: patent@kaardal.com

Full Name of Inventor: **ROBERT A. FRANCIS**

Robert A. Francis Date: 10/17/2000  
Inventor's Signature

Residence: **BAY POINT, CALIFORNIA**

Citizenship: **UNITED STATES OF AMERICA**

Post Office Address: **55 PACIFICA AVE SPACE 48  
BAY POINT, CA  
94565**



Applicant or Patentee: **ROBERT A. FRANCIS**

Serial or Patent Number:

Filed or Issued:

For: **IMPROVED TOILET SPLASH SHIELD SYSTEM**

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(f) and 1.27(b) - INDEPENDENT INVENTOR**

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled as above and described in:

☒ the specification filed herewith.

☐ application serial number \_\_\_\_\_, filed \_\_\_\_\_.

☐ patent no. \_\_\_\_\_, issued \_\_\_\_\_.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☒ no such person, concern, or organization

☐ persons, concerns or organizations listed below\*

\*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME: NOT APPLICABLE

☐ INDIVIDUAL

ADDRESS: NOT APPLICABLE

☐ SMALL BUSINESS CONCERN

☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate (37 CFR 1.28(b)).

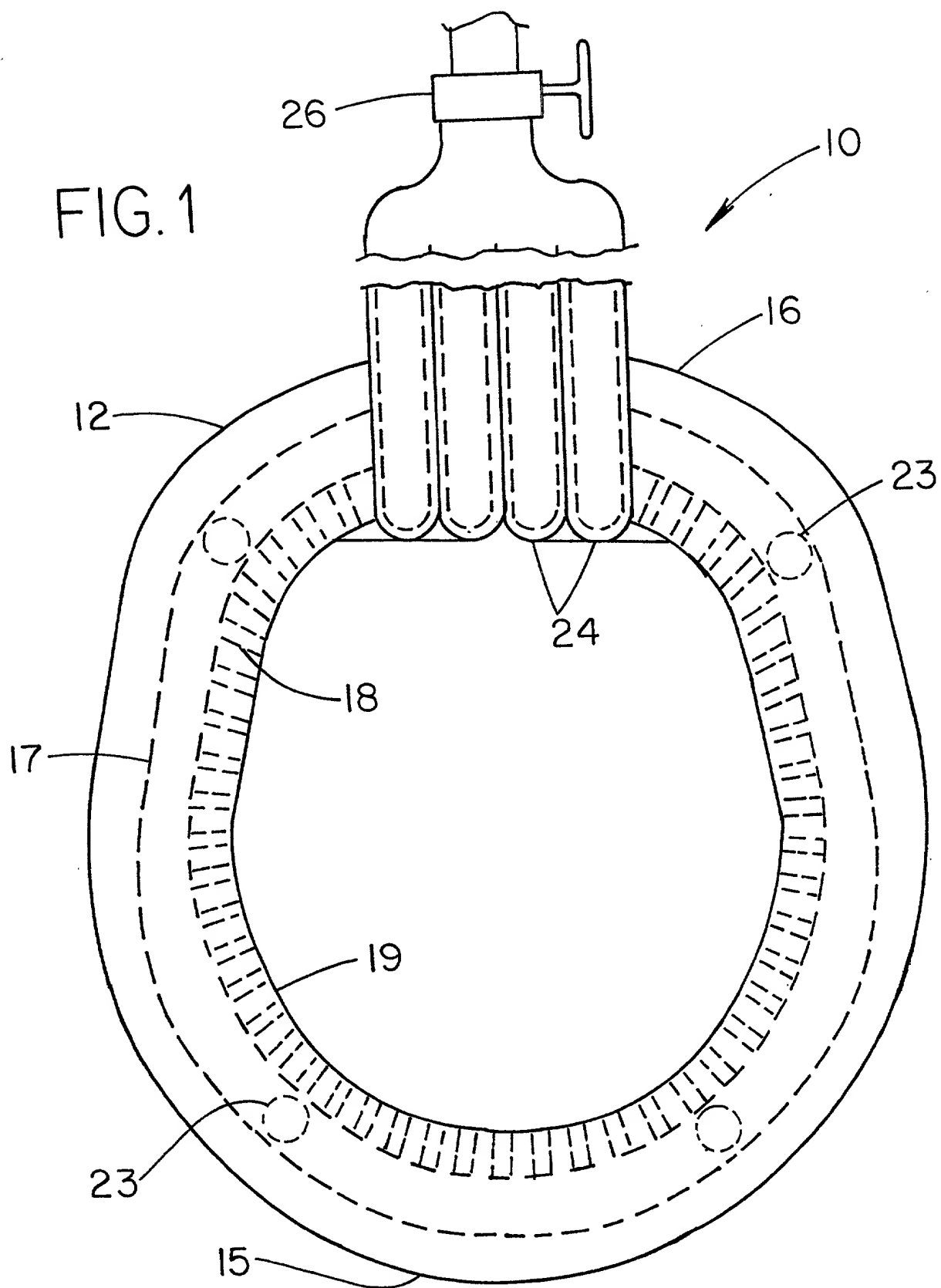
Overall Performance		Performance	
Year	Score	Year	Score
2000	85.0	2000	85.0
2001	86.0	2001	86.0
2002	87.0	2002	87.0
2003	88.0	2003	88.0
2004	89.0	2004	89.0
2005	90.0	2005	90.0
2006	91.0	2006	91.0
2007	92.0	2007	92.0
2008	93.0	2008	93.0
2009	94.0	2009	94.0
2010	95.0	2010	95.0
2011	96.0	2011	96.0
2012	97.0	2012	97.0
2013	98.0	2013	98.0
2014	99.0	2014	99.0
2015	100.0	2015	100.0
2016	100.0	2016	100.0
2017	100.0	2017	100.0
2018	100.0	2018	100.0
2019	100.0	2019	100.0
2020	100.0	2020	100.0
2021	100.0	2021	100.0
2022	100.0	2022	100.0
2023	100.0	2023	100.0
2024	100.0	2024	100.0
2025	100.0	2025	100.0
2026	100.0	2026	100.0
2027	100.0	2027	100.0
2028	100.0	2028	100.0
2029	100.0	2029	100.0
2030	100.0	2030	100.0
2031	100.0	2031	100.0
2032	100.0	2032	100.0
2033	100.0	2033	100.0
2034	100.0	2034	100.0
2035	100.0	2035	100.0
2036	100.0	2036	100.0
2037	100.0	2037	100.0
2038	100.0	2038	100.0
2039	100.0	2039	100.0
2040	100.0	2040	100.0
2041	100.0	2041	100.0
2042	100.0	2042	100.0
2043	100.0	2043	100.0
2044	100.0	2044	100.0
2045	100.0	2045	100.0
2046	100.0	2046	100.0
2047	100.0	2047	100.0
2048	100.0	2048	100.0
2049	100.0	2049	100.0
2050	100.0	2050	100.0
2051	100.0	2051	100.0
2052	100.0	2052	100.0
2053	100.0	2053	100.0
2054	100.0	2054	100.0
2055	100.0	2055	100.0
2056	100.0	2056	100.0
2057	100.0	2057	100.0
2058	100.0	2058	100.0
2059	100.0	2059	100.0
2060	100.0	2060	100.0
2061	100.0	2061	100.0
2062	100.0	2062	100.0
2063	100.0	2063	100.0
2064	100.0	2064	100.0
2065	100.0	2065	100.0
2066	100.0	2066	100.0
2067	100.0	2067	100.0
2068	100.0	2068	100.0
2069	100.0	2069	100.0
2070	100.0	2070	100.0
2071	100.0	2071	100.0
2072	100.0	2072	100.0
2073	100.0	2073	100.0
2074	100.0	2074	100.0
2075	100.0	2075	100.0
2076	100.0	2076	100.0
2077	100.0	2077	100.0
2078	100.0	2078	100.0
2079	100.0	2079	100.0
2080	100.0	2080	100.0
2081	100.0	2081	100.0
2082	100.0	208	

Robert A. Francis  
Inventor's Signature

Date: 10/17/2000

009207 54645960

FIG. 1



009207" 54646960

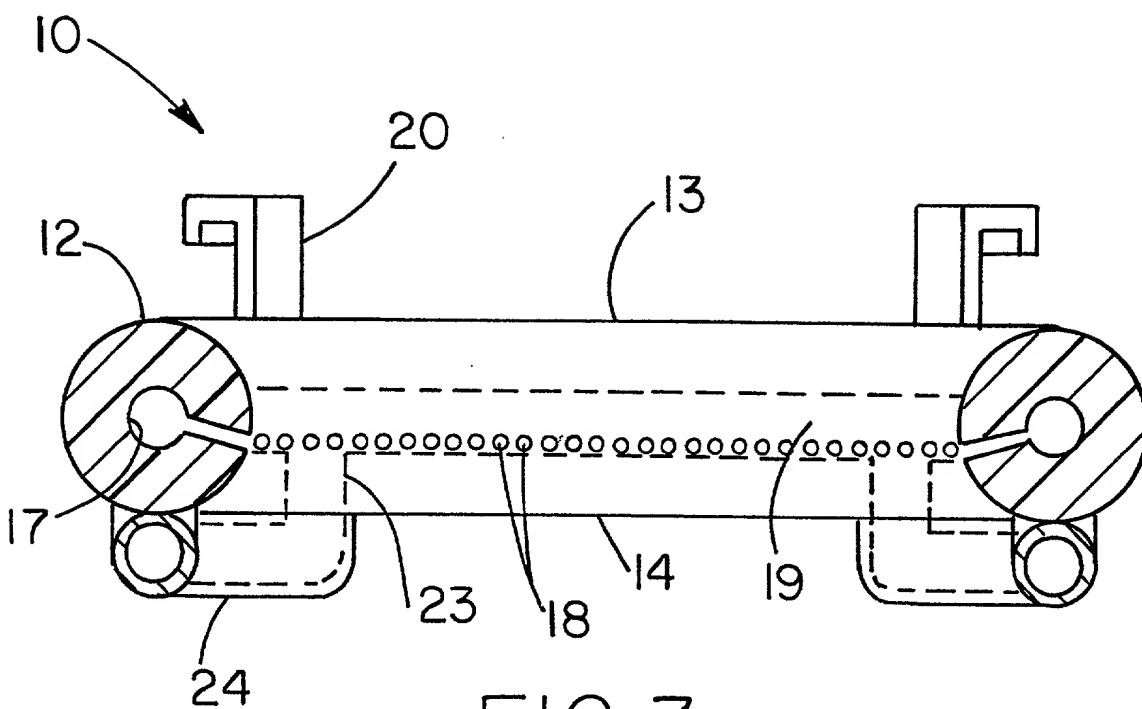


FIG. 3

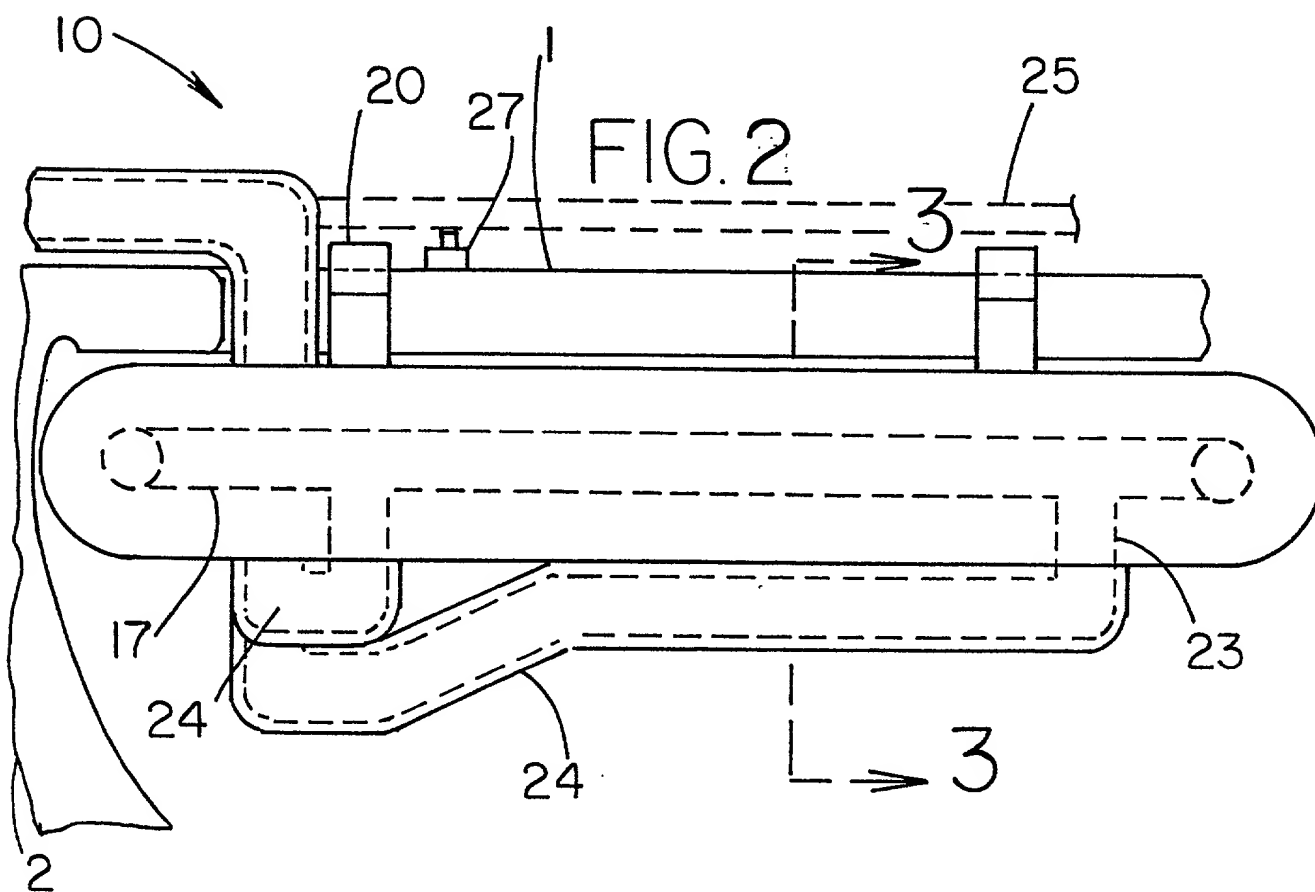


FIG. 2

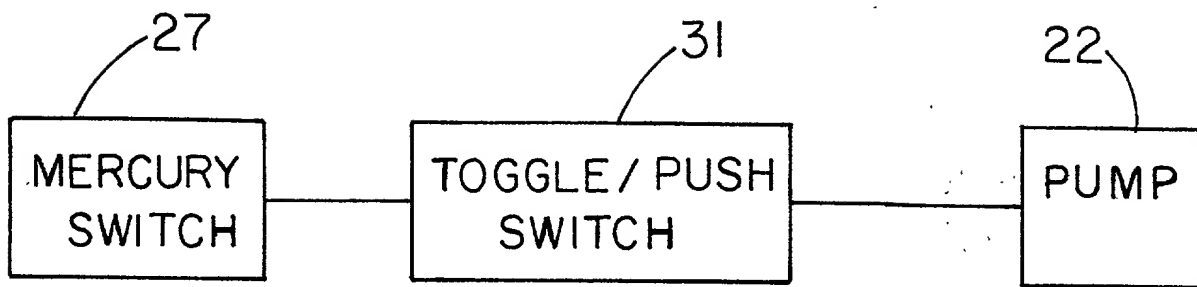


FIG.4

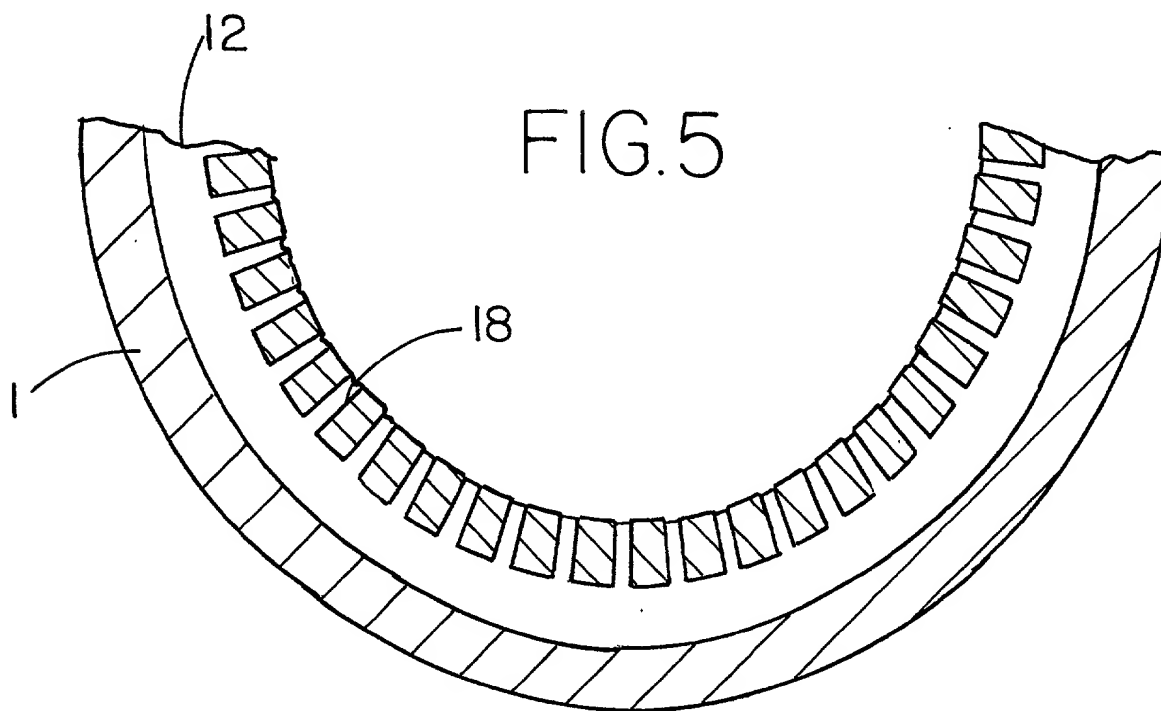


FIG.5

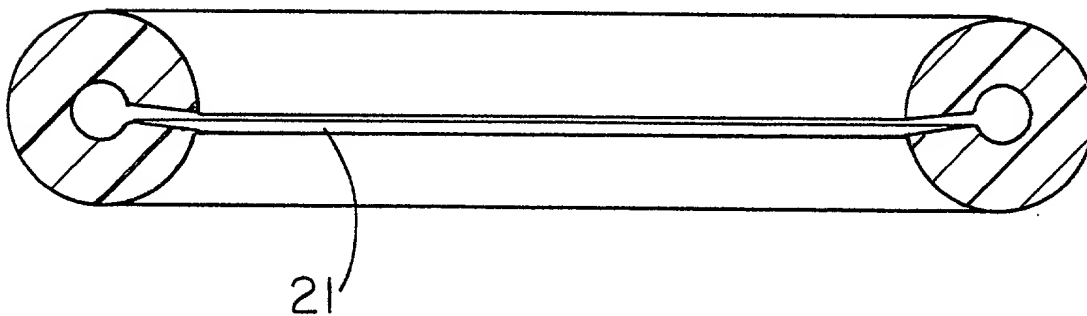


FIG.6

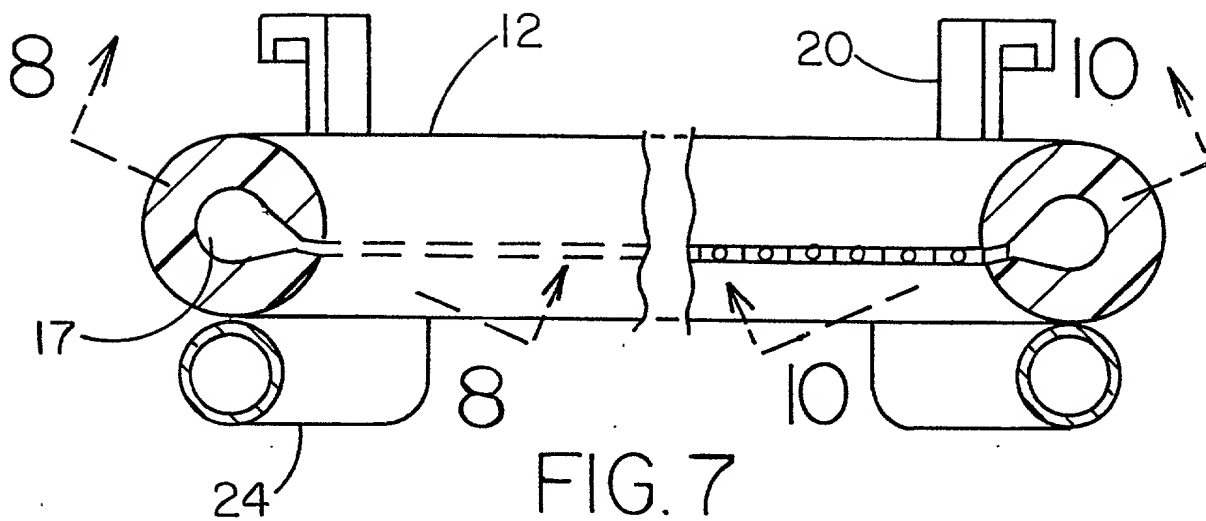


FIG. 8

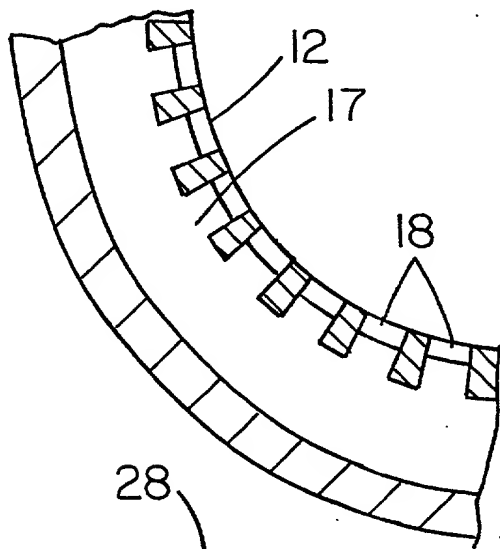


FIG. 10

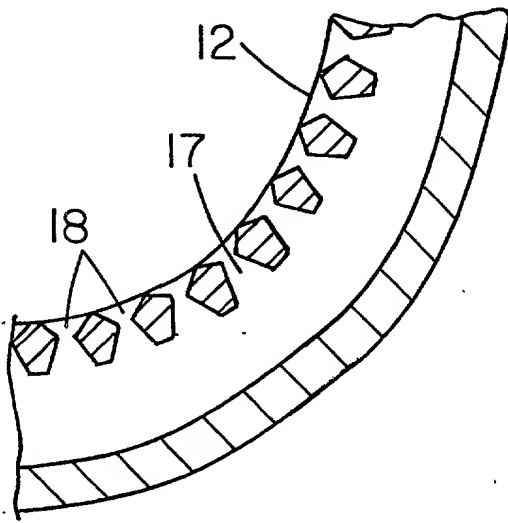
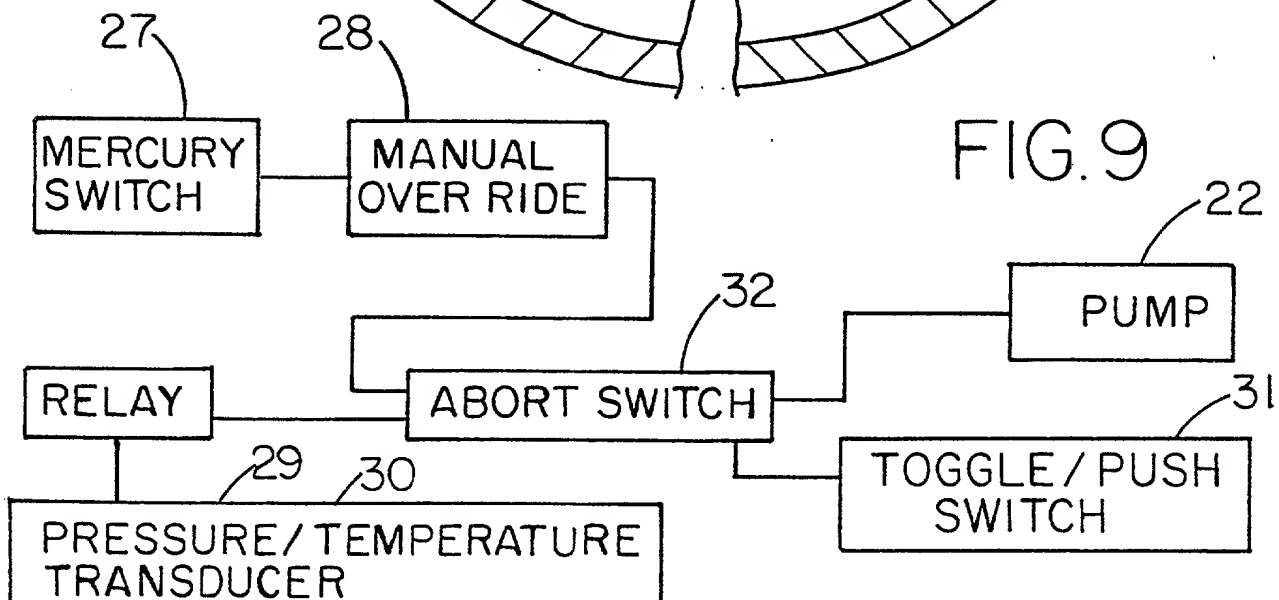


FIG. 9



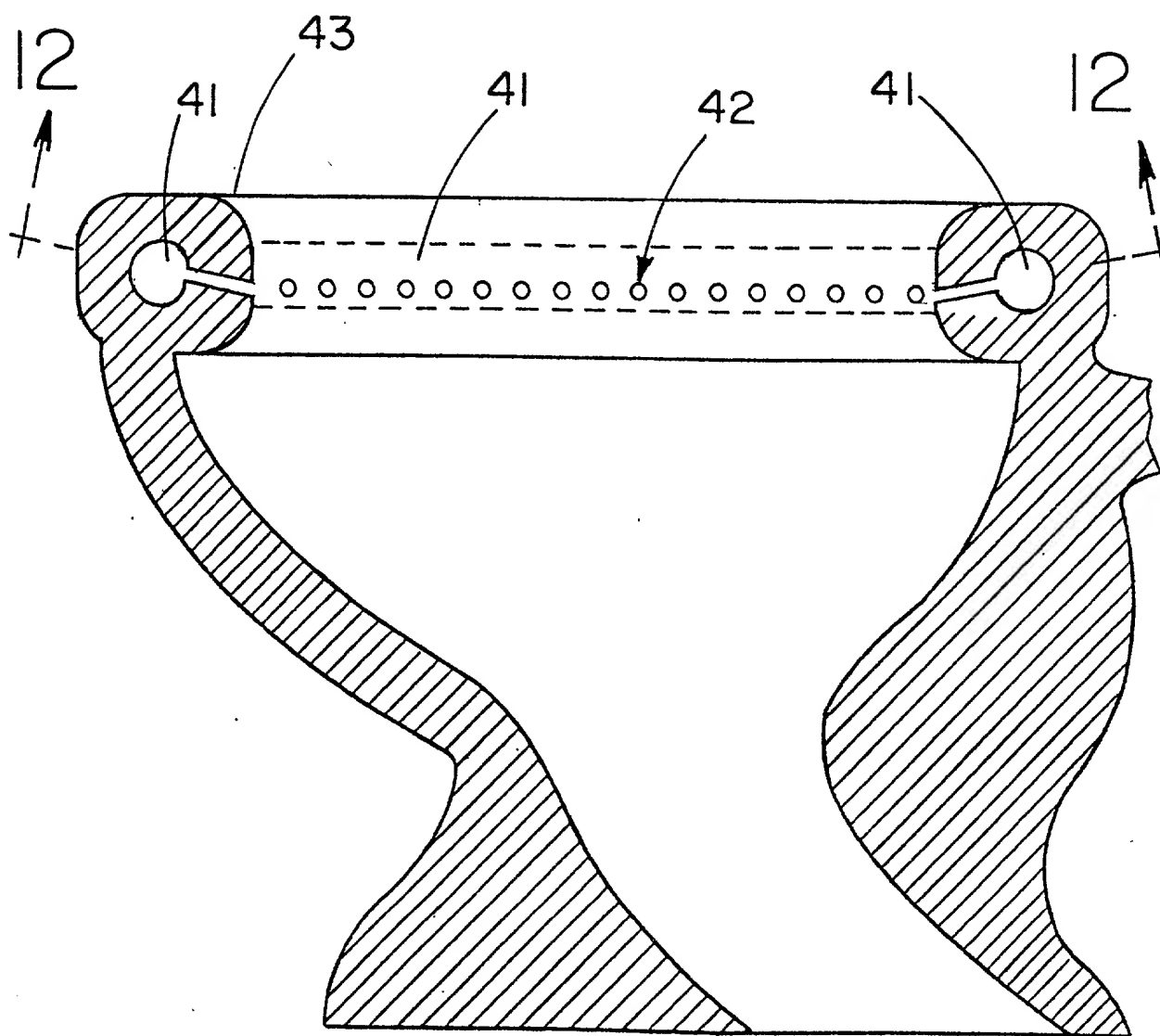


FIG. 11

FIG. 12

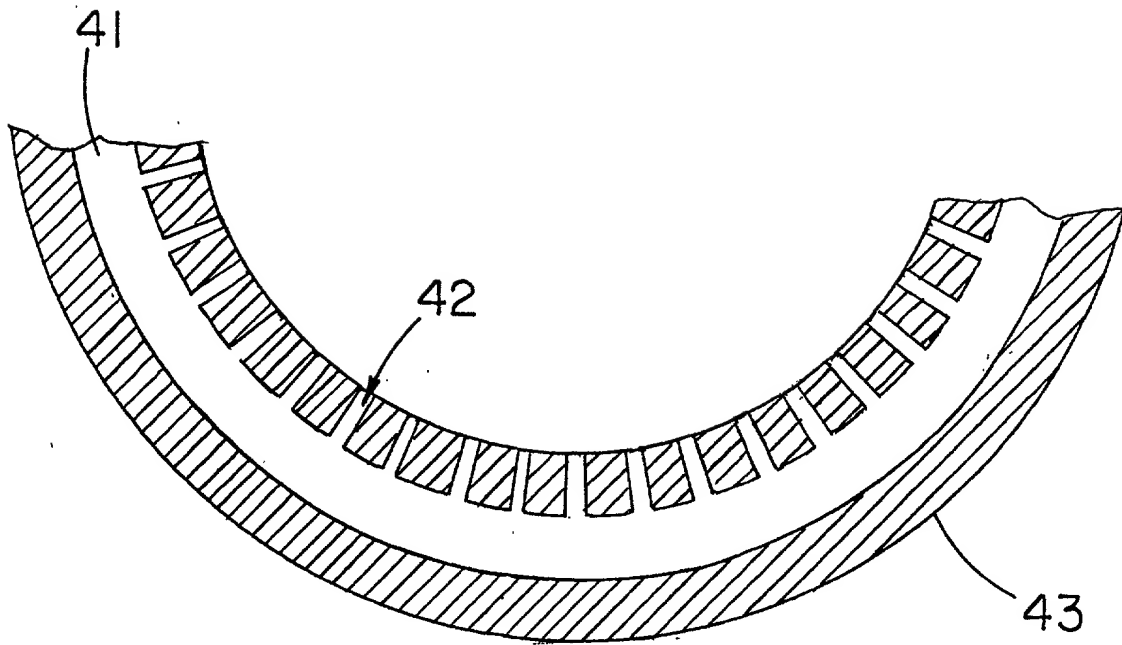


FIG. 13

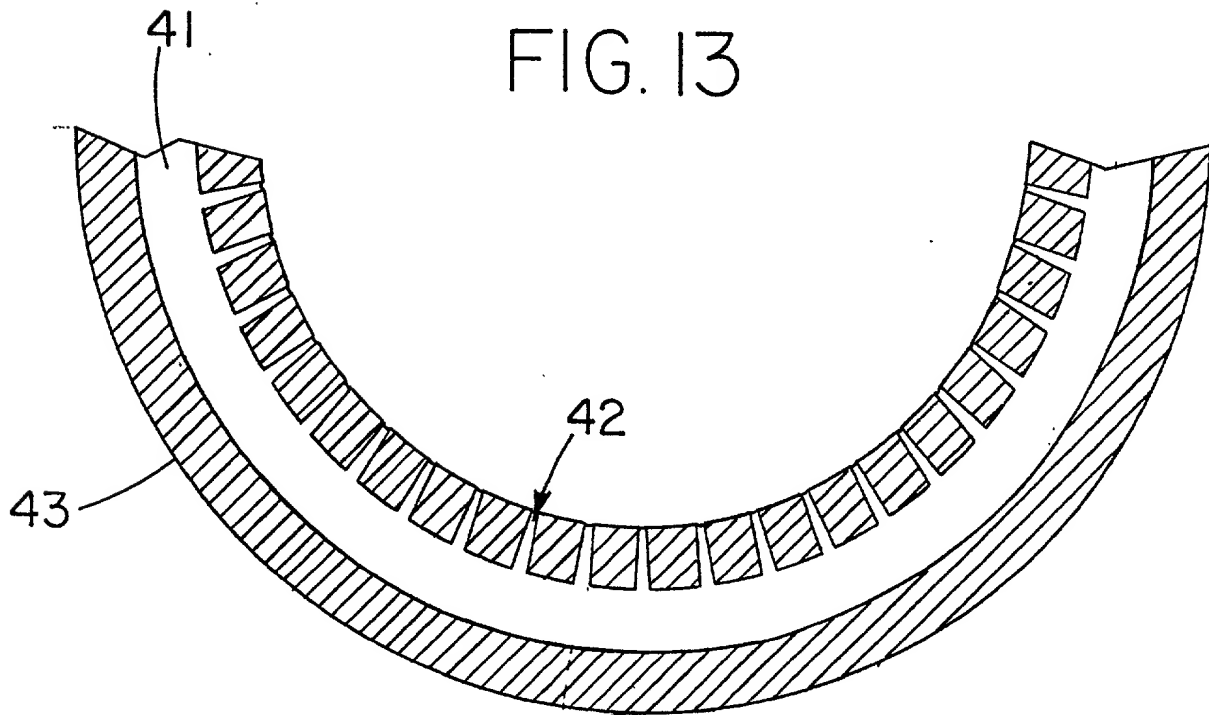




FIG. 14

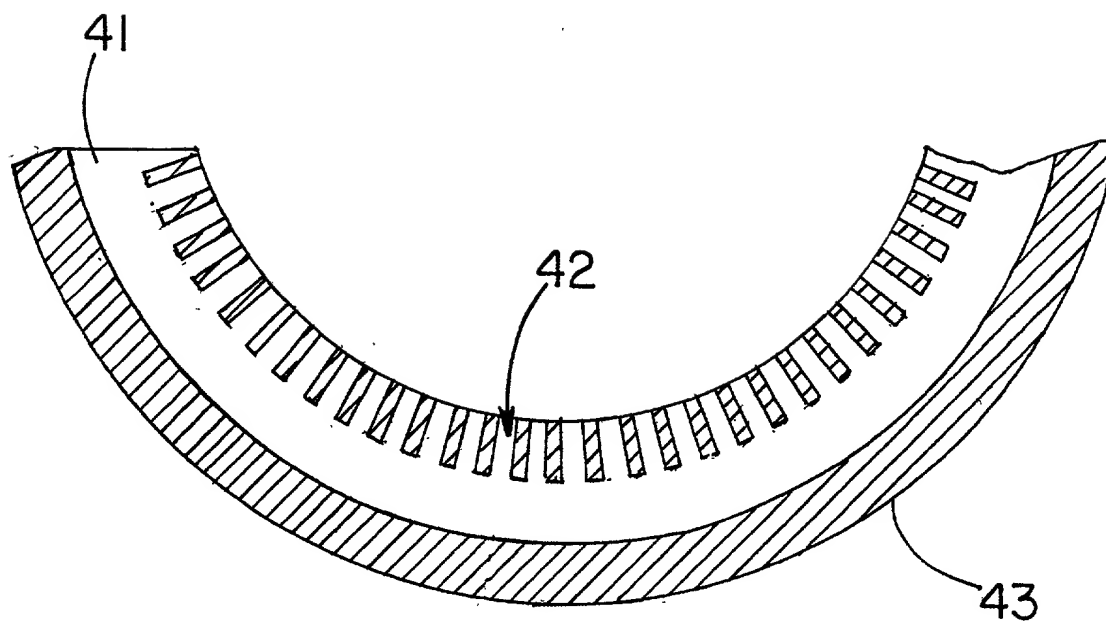
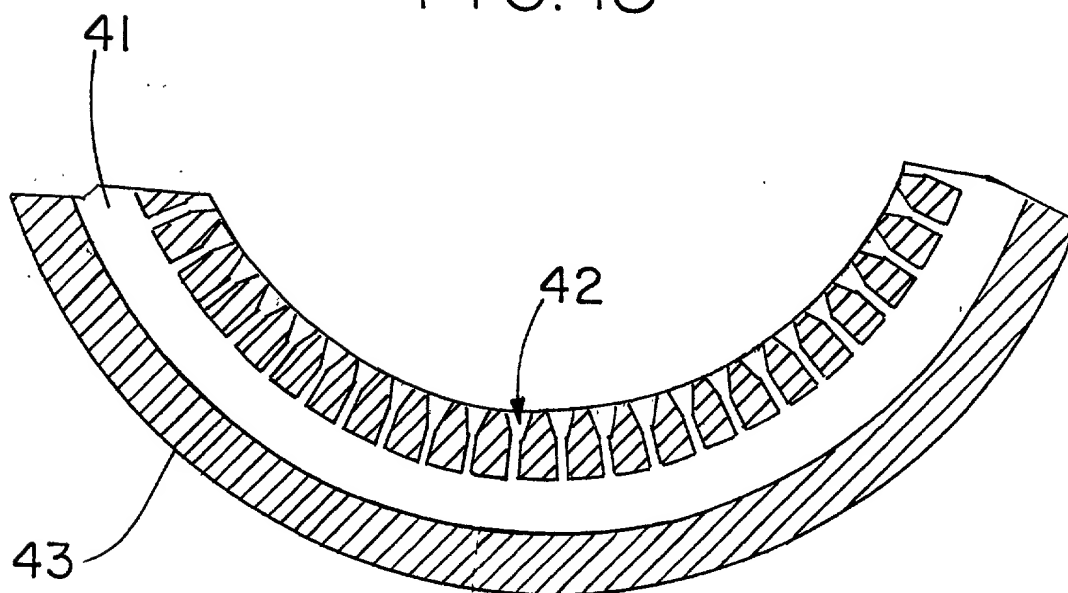


FIG. 15



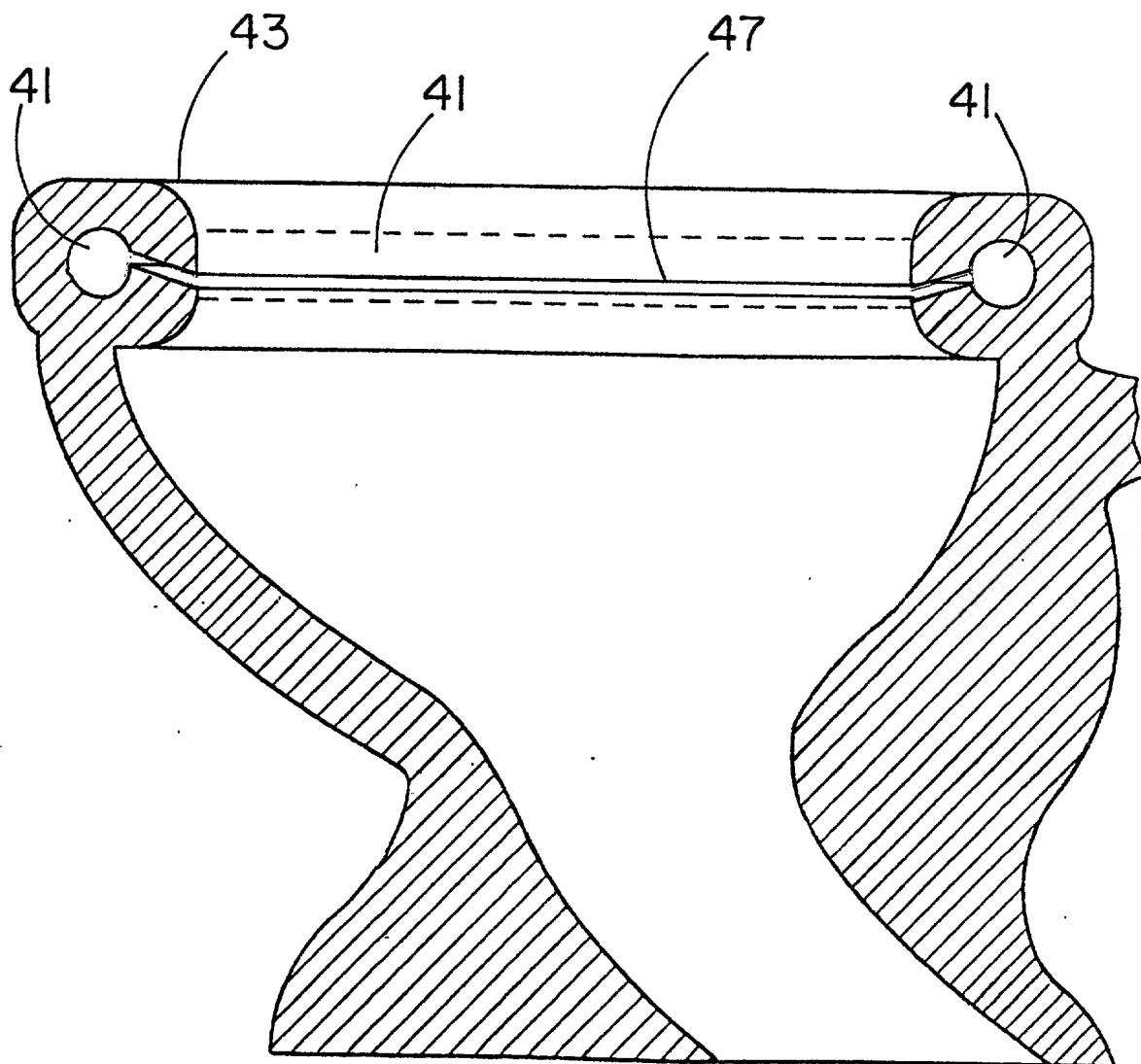
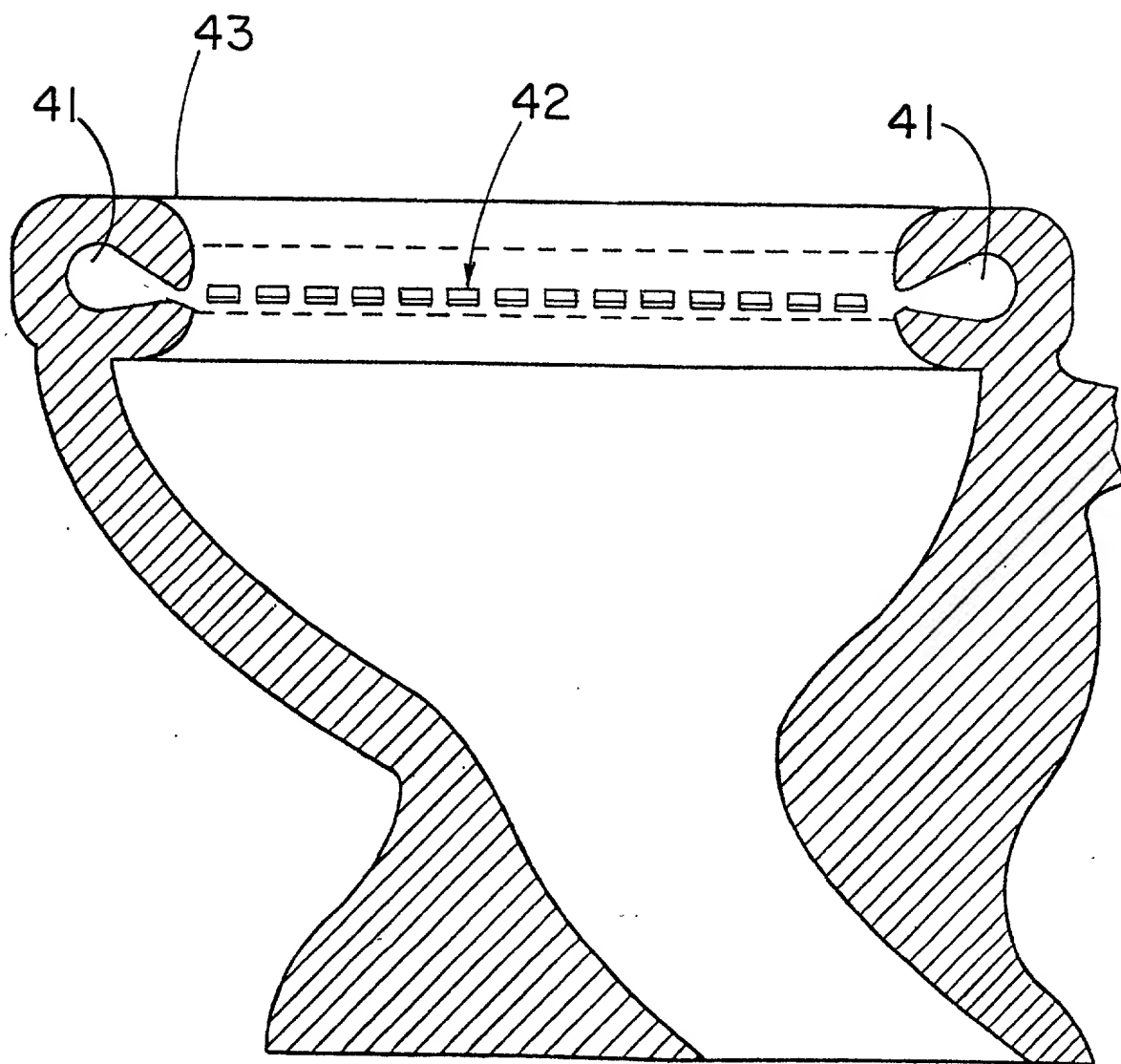


FIG. 16

FIG. 17



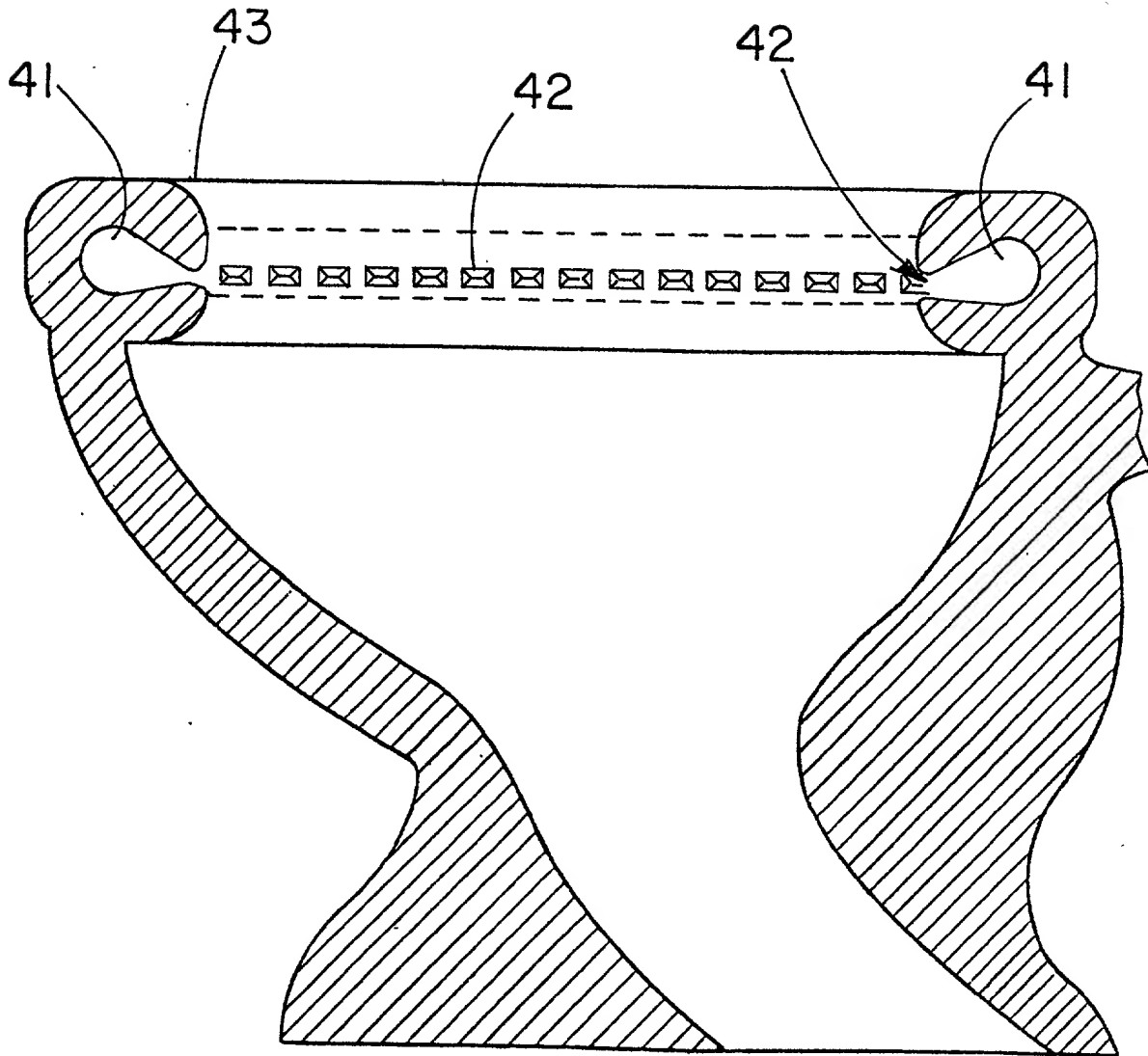


FIG. 18

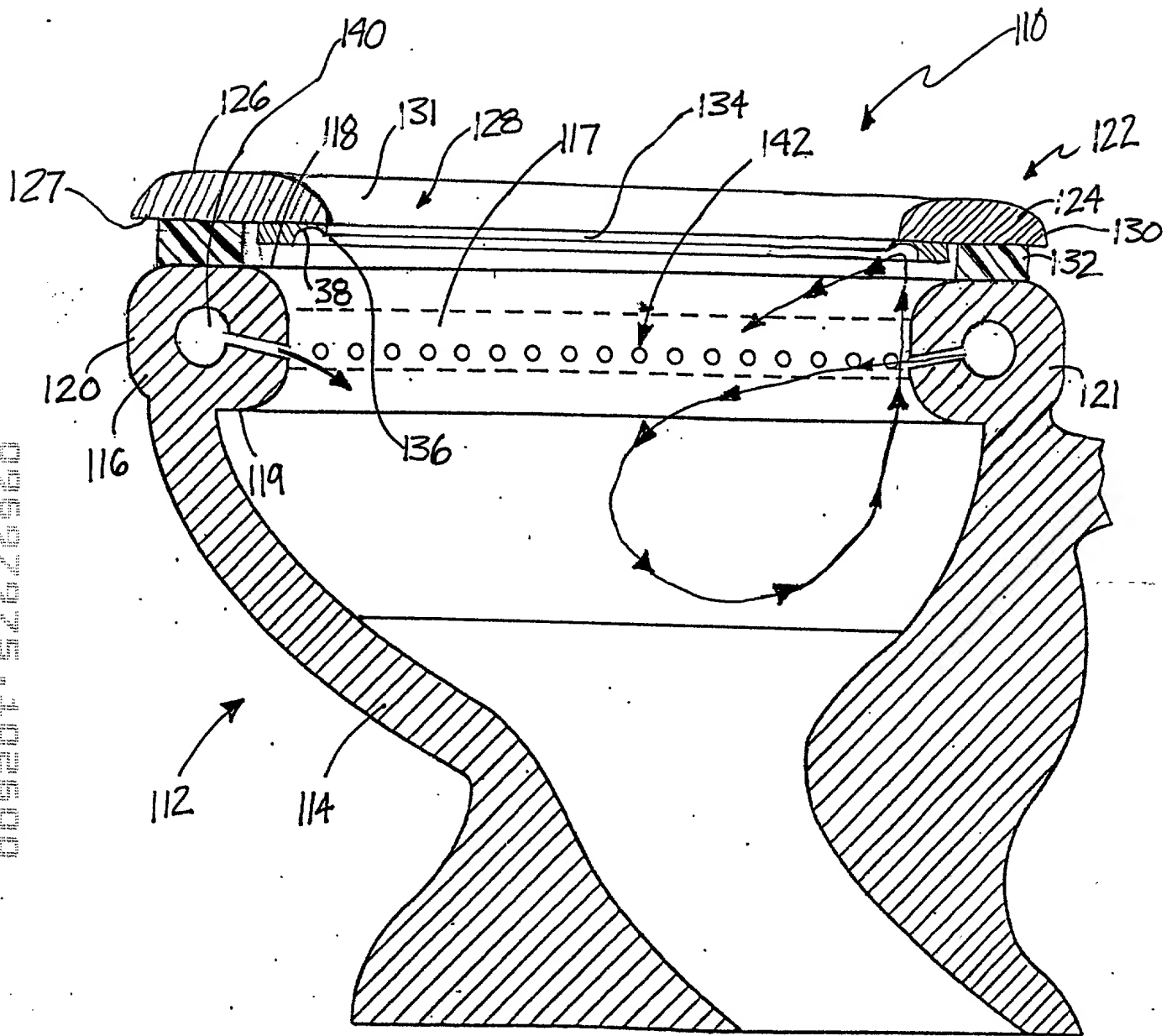


FIG. 19

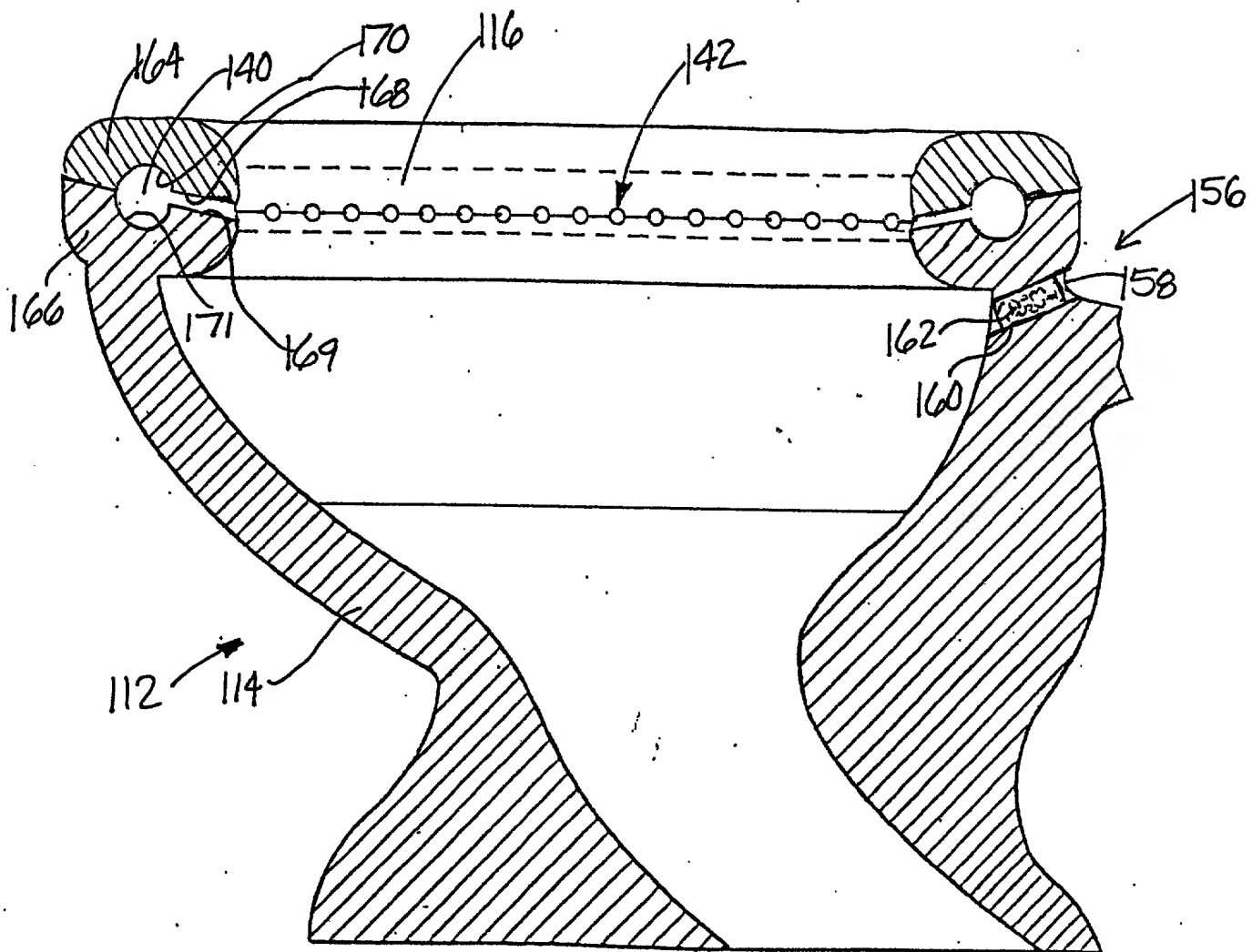
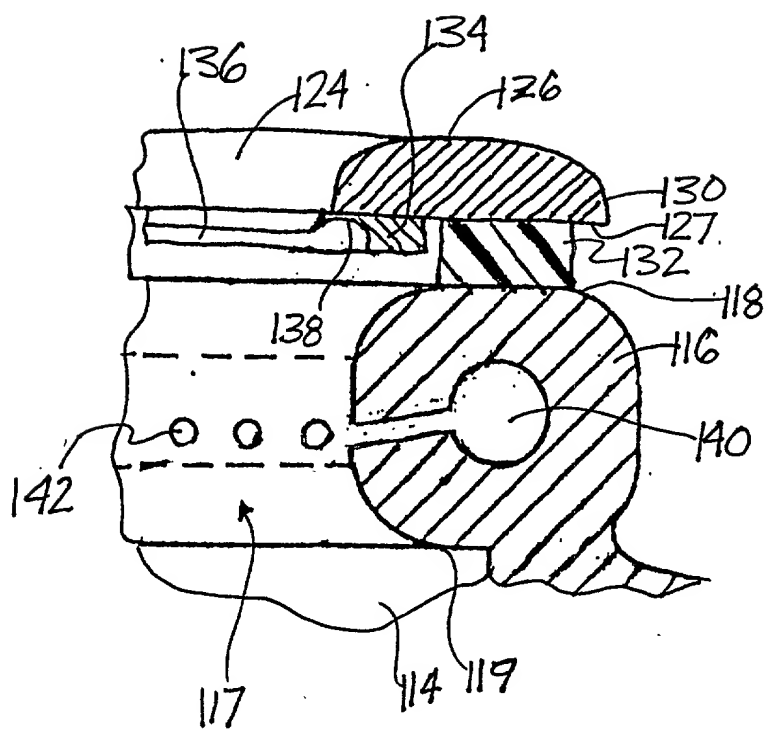


FIG. 20

009207" 52646950



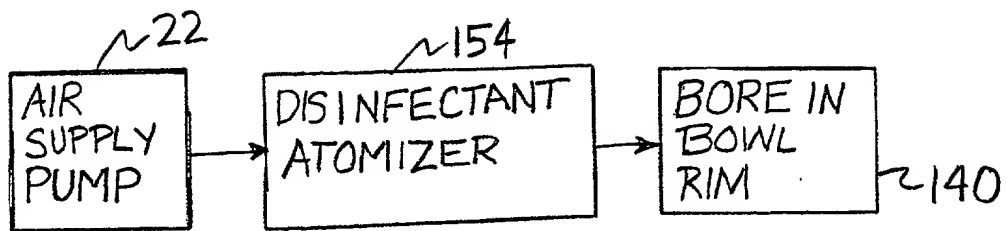


FIG. 22

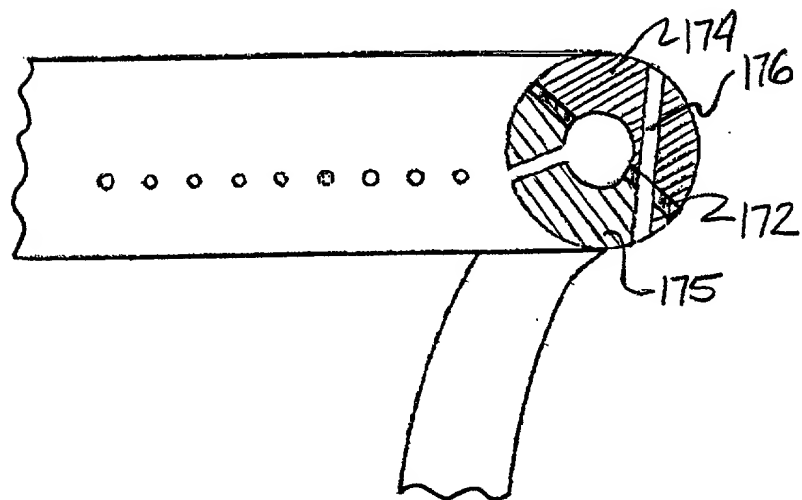


FIG. 23



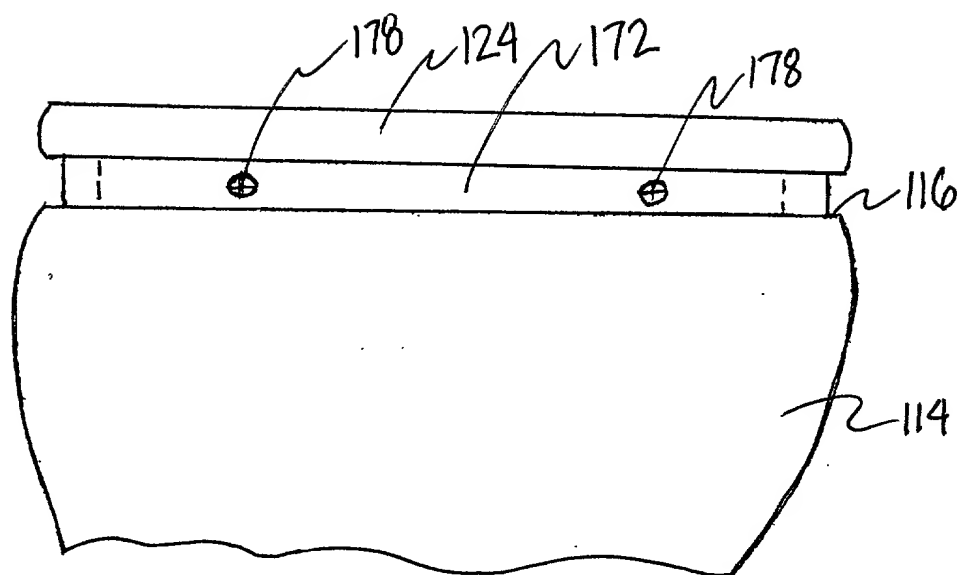


FIG. 24